CLAIMS

I claim:

1. A plasma reformer for dissociating water and hydrocarbon fuel in a preheated gaseous form comprising:

a turbulent heating zone containing micro-porous articulated material with a first impervious ceramic wall laterally bounding it;

a reaction chamber downstream from the turbulent heating zone, the reaction chamber having emitter electrode means attached to the first impervious ceramic wall laterally bounding it, an inner lateral wall containing collector electrode means, and an electric circuit maintained between the emitter electrode means and the collector electrode means;

an energy retaining zone containing micro-porous articulated material arrayed downstream from the reaction chamber;

low thermal conductivity materials surrounding the energy retaining zone;

compression-expansion cushion material surrounding the low thermal conductivity material;

a casing; and

means for introducing gaseous material in a flow into the turbulent heating zone and for removing a reformate stream from the energy retaining zone.

2. A plasma reformer as set forth in Claim 1 wherein the emitter electrode means have a multiplicity of thin needle-like extrusions.

3. A plasma reformer as set forth in Claim 2 wherein the needle-like extrusions have diameters between 1 nanometer and 100 micrometers.

4. A plasma reformer as set forth in Claim 3 wherein the emitter and collector electrode means are a metal selected from a group consisting of tungsten, zirconium, titanium, molybdenum, and alloys thereof.

5. A plasma reformer as set forth in Claim 4 further comprising an ion neutralizing filter surrounding the collector electrode in the reaction chamber.

6. A plasma reformer as set forth in Claim 5 further comprising a second ceramic wall laterally surrounding the energy retaining zone and inside of the low thermal conductivity material.

7. A plasma reformer as set forth in Claim 6 wherein the material in the turbulent heating zone and the energy retaining zone have micro-porous structure layers selected from a group consisting of alumina, silica, mullite, titanate, spinel, zirconia, or some combination thereof.

8. A plasma reformer as set forth in Claim 7 wherein the low conductivity materials are vacuum form fibers arrayed interior to fiber blankets, the vacuum form fibers having a greater density and a higher percentage of higher melting point material than the fiber blankets.

9. A plasma reformer as set forth in Claim 8 wherein the compression-expansion cushion mat material is low thermal conductive material having a great capacity of absorbing thermal compression-expansion, shocks and vibrations and having the ability of sealing and protecting reformer material.

10. A plasma reformer as set forth in Claim 5 wherein the ion neutralizing filter material is a semiconductor.

11. A plasma reformer as set forth in Claim 5 wherein the ion neutralizing filter material is a ceramic alloy.

12. A plasma reformer as set forth in Claim 1 wherein there are plural electric circuits connected to plural electricity sources.

13. A plasma reformer as set forth in Claim 1 wherein the means for introducing gaseous material in a flow into the turbulent heating zone and for removing a reformate stream from the energy retaining zone are double-walled tubes have an inner wall of a ceramic material and an outer wall of stainless steel.

14. A process for reforming a preheated gaseous mixture of H_2O and hydrocarbon fuels to produce hydrogen comprising:

further heating and mixing the mixture in a turbulent heating zone;

dissociating the H_2O through ionizing and dissociating the hydrocarbon fuel through ionization and heat in a reaction chamber having emitter electrodes means in an outer wall, central collector electrode means, electric circuits maintained between the emitter electrode means and the collector electrode means causing copious numbers of high energy electron to be emitted from the emitter electrode to interact with the hydrocarbon fuel thereby dissociating the hydrocarbon fuel and forming low energy electrons that dissociate H_2O; and

further dissociating products leaving the reaction chamber in an energy retaining zone.

15. A process as set forth in Claim 14 wherein the emitter electrodes have a multiplicity of thin needle-like extrusions.

16. A process as set forth in Claim 15 wherein the needle-like extrusions have diameters between 1 nanometer and 100 micrometers.

17. A process as set forth in Claim 16 wherein the material in the turbulent heating zone and the energy retaining zone have micro-porous structure layers selected from a group consisting of alumina, silica, mullite, titanate, spinel, zirconia, or some combination thereof.